

What is claimed is:

1. A method of manufacturing a semiconductor device,
comprising the steps of:

providing a semiconductor chip having a quadrangular main surface, a wiring substrate with the semiconductor chip disposed on a main surface thereof, and a molding die having a cavity and a resin pouring gate, the cavity having a quadrangular main surface which confronts the main surface of the semiconductor chip, the resin pouring gate being formed in a side face extending along a first side of the main surface of the cavity; and

positioning the wiring substrate in the molding die in such a manner that the main surface of the semiconductor chip and the main surface of the cavity confront each other and that a first side of the main surface of the semiconductor chip confronts the first side of the main surface of the cavity, and thereafter pouring resin into the cavity through the resin pouring gate to form a resin seal member which seals the semiconductor chip with the resin,

wherein the resin sealing step for the semiconductor chip is carried out in a state in which, in a section orthogonal to a second side of the main surface of the semiconductor chip which intersects the first side of the main surface of the semiconductor chip, a sectional area of

an area between the main surface of the wiring substrate and the main surface of the cavity at a position outside a side face along the extending direction of the second side of the main surface of the semiconductor chip is smaller than a sectional area of an area between the main surface of the semiconductor chip and the main surface of the cavity.

2. A method according to claim 1, wherein the resin pouring gate is opposed to the first side of the main surface of the semiconductor chip.

3. A method according to claim 1, wherein the resin pouring gate is opposed to a central part of a first side of a main surface of the resin seal member.

4. A semiconductor device comprising:

a semiconductor chip having a quadrangular main surface;

a wiring substrate with the semiconductor chip disposed on a main surface thereof;

a resin seal member for sealing the semiconductor chip, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip;

and

a gate cut trace portion formed on a side face extending along a first side of the main surface of the

resin seal member,

the first side of the main surface of the resin seal member extending along a first side of the main surface of the semiconductor chip, the main surface of the resin seal member having a second side which intersects the first side thereof and which extends along a second side intersecting the first side of the main surface of the semiconductor chip,

wherein, in a section orthogonal to the second side of the main surface of the semiconductor chip, a sectional area of an area between the main surface of the wiring substrate and the main surface of the resin seal member at a position outside a side face of the semiconductor chip is smaller than a sectional area of an area between the main surface of the semiconductor chip and the main surface of the resin seal member.

5. A semiconductor device according to claim 4, wherein the gate cut trace portion is opposed to the first side of the main surface of the semiconductor chip.

6. A semiconductor device according to claim 4, wherein the gate cut trace portion is opposed to a central part of the first side of the main surface of the resin seal member.

7. A semiconductor device according to claim 4, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of

the main surface of the semiconductor chip are a short side and a long side, respectively.

9. A semiconductor device according to claim 4, wherein the resin seal member is formed on the main surface of the wiring substrate.

10. A semiconductor device according to claim 4, wherein the plural semiconductor chips are disposed at predetermined intervals in the extending direction of the second side of the main surface of the resin seal member.

11. A semiconductor device according to claim 10,

wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a long side and a short side, respectively, and

wherein the main surface of the resin seal member is formed in a rectangular shape in which the first and second sides of the main surface of the resin seal member are a short side and a long side, respectively.

12. A semiconductor device according to claim 10,

wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a short side and a long side, respectively, and

wherein the main surface of the resin seal member is formed in a rectangular shape in which the first and second

sides of the main surface of the resin seal member are a short side and a long side, respectively.

13. A semiconductor device comprising:

a semiconductor chip having a quadrangular main surface;

a wiring substrate with the semiconductor chip disposed on a main surface thereof;

a resin seal member for sealing the semiconductor chip, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip, with a gate cut trace portion being formed on a side face extending along a first side of the main surface of the resin seal member,

wherein the first side of the main surface of the resin seal member extends along a first side of the main surface of the semiconductor chip, a second side which intersects the first side of the main surface of the resin seal member extends along a second side which intersects the first side of the main surface of the semiconductor chip, a third side which confronts the first side of the main surface of the resin seal member extends along a third side which confronts the first side of the main surface of the semiconductor chip, and a fourth side which confronts the second side of the main surface of the resin seal member extends along a fourth side which confronts the

second side of the main surface of the semiconductor chip,
and

wherein, in a section orthogonal to the second and fourth sides of the main surface of the semiconductor chip, a sectional area of an area between the main surface of the wiring substrate and the main surface of the resin seal member at a position outside the second side of the semiconductor chip, and a sectional area of an area between the main surface of the wiring substrate and the main surface of the resin seal member at a position outside the fourth side of the semiconductor chip, are each smaller than one half of a sectional area of an area between the main surface of the semiconductor chip and the main surface of the resin seal member.

14. A semiconductor device according to claim 13, wherein the plural semiconductor chips are disposed at predetermined intervals in the extending direction of the second side of the main surface of the resin seal member.

15. A semiconductor device according to claim 14,

wherein the main surface of each said semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a long side and a short side, respectively, and

wherein the main surface of the resin seal member is formed in a rectangular shape in which the first and second

sides of the main surface of the resin seal member are a short side and a long side, respectively.

16. A semiconductor device according to claim 14,

wherein the main surface of each said semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a short side and a long side, respectively, and

wherein the main surface of the resin seal member is formed in a rectangular shape in which the first and second sides of the main surface of the resin seal member are a short side and a long side, respectively.

17. A method of manufacturing a semiconductor device, comprising the steps of:

providing a semiconductor chip having a quadrangular main surface, a wiring substrate with the semiconductor chip disposed on a main surface thereof, and a molding die having a cavity and a resin pouring gate, the cavity having a quadrangular main surface which confronts the main surface of the semiconductor chip, the resin pouring gate being formed in a side face extending along a first side of the main surface of the cavity; and

positioning the wiring substrate in the molding die in such a manner that the main surface of the semiconductor chip and the main surface of the cavity confront each other, the first side of the main surface of the cavity extends

along a first side of the main surface of the semiconductor chip, a second side which intersects the first side of the main surface of the cavity extends along a second side which intersects the first side of the main surface of the semiconductor chip, a third side which confronts the first side of the main surface of the cavity extends along a third side which confronts the first side of the main surface of the semiconductor chip, and a fourth side which confronts the second side of the main surface of the cavity extends along a fourth side which confronts the second side of the main surface of the semiconductor chip, and thereafter pouring resin into the cavity through the resin pouring gate to seal the semiconductor chip with the resin,

wherein the resin sealing step for the semiconductor chip is carried out in a state in which the distance from a side face extending along the third side of the main surface of the semiconductor chip to a side face extending along the third side of the main surface of the cavity is longer than the distance from a side face extending along the second side of the main surface of the semiconductor chip to a side face extending along the second side of the main surface of the cavity and is longer than the distance from a side face extending along the fourth side of the main surface of the semiconductor chip to a side face extending along the fourth side of the main surface of the

cavity.

18. A semiconductor device comprising:

a semiconductor chip having a quadrangular main surface;

a wiring substrate with the semiconductor chip disposed on a main surface thereof;

a resin seal member for sealing the semiconductor chip, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip, with a gate cut trace portion being formed on a side face extending along a first side of the main surface of the resin seal member,

wherein the first side of the main surface of the resin seal member extends along a first side of the main surface of the semiconductor chip, a second side which intersects the first side of the main surface of the resin seal member extends along a second side which intersects the first side of the main surface of the semiconductor chip, a third side which confronts the first side of the main surface of the resin seal member extends along a third side which confronts the first side of the main surface of the semiconductor chip, and a fourth side which confronts the second side of the main surface of the resin seal member extends along a fourth side which confronts the second side of the main surface of the semiconductor chip,

and

wherein the distance from a side face extending along the third side of the main surface of the semiconductor chip to a side face extending along the third side of the main surface of the resin seal member is longer than the distance from a side face extending along the second side of the main surface of the semiconductor chip to a side face extending along the second side of the main surface of the resin seal member and is longer than the distance from a side face extending along the fourth side of the main surface of the semiconductor chip to a side face extending along the fourth side of the main surface of the resin seal member.

19. A semiconductor device comprising:

a semiconductor chip having a quadrangular main surface;

a wiring substrate with the semiconductor chip disposed on a main surface thereof;

a plurality of first connections formed on the main surface of the semiconductor chip and arranged in an extending direction of a first side of the main surface of the semiconductor chip;

a plurality of second connections formed on the main surface of the wiring substrate at a position outside the first side of the main surface of the semiconductor chip

and arranged in the extending direction of the first side of the main surface of the semiconductor chip;

a plurality of bonding wires for electrically connecting the plural, first and second connections with each other;

a resin seal member for sealing the semiconductor chip, the plural, first and second connections and the plural bonding wires, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip, the main surface of the resin seal member having a first side extending along the first side of the main surface of the semiconductor chip; and

a gate cut trace portion formed on a side face extending along the first side of the main surface of the resin seal member.

20. A semiconductor device according to claim 19, wherein the gate cut trace portion is opposed to the first side of the main surface of the semiconductor chip.

21. A semiconductor device according to claim 19, wherein the gate cut trace portion is opposed to a central part of the first side of the main surface of the resin seal member.

22. A semiconductor device according to claim 19, wherein the plural bonding wires extend across the first side of the main surface of the semiconductor chip.

23. A semiconductor device according to claim 19, wherein

the plural, first connections are arranged along the first side of the main surface of the semiconductor chip.

24. A semiconductor device according to claim 19, wherein the plural, first connections are arranged at a center of the main surface of the semiconductor chip.

25. A semiconductor device according to claim 19, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first side of the main surface of the semiconductor chip is a long side and a second side which intersects the first side of the main surface of the semiconductor chip is a short side.

26. A semiconductor device according to claim 19, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first side of the main surface of the semiconductor chip is a short side and a second side which intersects the first side of the main surface of the semiconductor chip is a long side.

27. A semiconductor device according to claim 19, wherein the resin seal member is formed on the main surface of the wiring substrate.

28. A semiconductor device comprising:

a semiconductor chip having a quadrangular main surface;

a wiring substrate with the semiconductor chip disposed on a main surface thereof;

a first connection and a third connection both formed on the main surface of the semiconductor chip;

a second connection formed on the main surface of the wiring substrate at a position outside a first side of the main surface of the semiconductor chip;

a fourth connection formed on the main surface of the wiring substrate at a position outside a second side which intersects the first side of the main surface of the semiconductor chip;

a first bonding wire for electrically connecting the first and second connections with each other;

a second bonding wire for electrically connecting the third and fourth connections with each other;

a resin seal member for sealing the semiconductor chip, the first to fourth connections and the first and second bonding wires, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip, the main surface of the resin seal member having a first side extending along the first side of the main surface of the semiconductor chip; and

a gate cut trace portion formed on a side face extending along the first side of the main surface of the resin seal member,

wherein the number of the first and second connections and the first bonding wire is larger than that

of the third and fourth connections and the second bonding wire.

29. A semiconductor device according to claim 28, wherein the gate cut trace portion is opposed to the first side of the main surface of the semiconductor chip.

30. A semiconductor device according to claim 28, wherein the gate cut trace portion is opposed to a central part of the first side of the main surface of the resin seal member.

31. A semiconductor device according to claim 28, wherein the first and second bonding wires extend across the first and second sides, respectively, of the main surface of the semiconductor chip.

32. A semiconductor device according to claim 28, wherein the first and third connections are disposed along the first and second sides, respectively, of the main surface of the semiconductor chip.

33. A semiconductor device according to claim 28, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a long side and a short side, respectively.

34. A semiconductor device according to claim 28, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a short side

and a long side, respectively.

35. A semiconductor device according to claim 28, wherein the resin seal member is formed on the main surface of the wiring substrate.

36. A semiconductor device comprising:

a semiconductor chip having a quadrangular main surface;

a wiring substrate with the semiconductor chip disposed on a main surface thereof;

a plurality of first connections formed on the main surface of the semiconductor chip and arranged along a first side of the main surface of the semiconductor chip;

a plurality of second connections formed on the main surface of the wiring substrate at a position outside the first side of the main surface of the semiconductor chip and arranged along the first side of the main surface of the semiconductor chip;

a plurality of third connections formed on the main surface of the semiconductor chip and arranged along a second side which intersects the first side of the main surface of the semiconductor chip;

a plurality of fourth connections formed on the main surface of the wiring substrate at a position outside the second side of the main surface of the semiconductor chip and arranged along the second side of the main surface of

the semiconductor chip;

a plurality of first bonding wires for electrically connecting the plural, first and second connections with each other;

a plurality of second bonding wires for electrically connecting the plural, third and fourth connections with each other;

a resin seal member for sealing the semiconductor chip, the plural, first to fourth connections and the plural first and second bonding wires, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip, the main surface of the resin seal member having a first side extending along the first side of the main surface of the semiconductor chip;

a gate cut trace portion formed on a side face extending along the first side of the main surface of the resin seal member,

wherein the distance from a side face extending along the second side of the main surface of the semiconductor chip to the fourth connection is shorter than the distance from a side face extending along the first side of the main surface of the semiconductor chip to the second connection.

37. A semiconductor device according to claim 36, wherein the gate cut trace portion is opposed to the first side of

the main surface of the semiconductor chip.

38. A semiconductor device according to claim 36, wherein the gate cut trace portion is opposed to a central part of the first side of the main surface of the resin seal member.

39. A semiconductor device according to claim 36, wherein the plural, first and second bonding wires extend across the first and second sides, respectively, of the main surface of the semiconductor chip.

40. A semiconductor device according to claim 36, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a long side and a short side, respectively.

41. A semiconductor device according to claim 36, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a short side and a long side, respectively.

42. A semiconductor device according to claim 36, wherein the resin seal member is formed on the main surface of the wiring substrate.

43. A semiconductor device comprising:

- a semiconductor chip having a quadrangular main surface;

- a wiring substrate with the semiconductor chip

disposed on a main surface thereof;

a plurality of first connections formed on the main surface of the semiconductor chip and arranged along a first side of the main surface of the semiconductor chip;

a plurality of second connections formed on the main surface of the wiring substrate at a position outside the first side of the main surface of the semiconductor chip and arranged along the first side of the main surface of the semiconductor chip;

a plurality of third connections formed on the main surface of the semiconductor chip and arranged along a second side which intersects the first side of the main surface of the semiconductor chip;

a plurality of fourth connections formed on the main surface of the wiring substrate at a position outside the second side of the main surface of the semiconductor chip and arranged along the second side of the main surface of the semiconductor chip;

a plurality of first bonding wires for electrically connecting the plural, first and second connections with each other;

a plurality of second bonding wires for electrically connecting the plural, third and fourth connections with each other;

a resin seal member for sealing the semiconductor

chip, the plural first to fourth connections and the plural first and second bonding wires, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip, the main surface of the resin seal member having a first side extending along the first side of the main surface of the semiconductor chip; and

a gate cut trace portion formed on a side face extending along the first side of the main surface of the resin seal member,

wherein an arrangement pitch of the plural fourth connections is wider than that of the plural second connections.

44. A semiconductor device according to claim 43, wherein an arrangement pitch of the plural third connections is wider than that of the plural first connections.

45. A semiconductor device according to claim 43, wherein the gate cut trace portion is opposed to the first side of the main surface of the semiconductor chip.

46. A semiconductor device according to claim 43, wherein the gate cut trace portion is opposed to a central part of the first side of the main surface of the resin seal member.

47. A semiconductor device according to claim 43, wherein the plural, first and second bonding wires extend across the first and second sides, respectively, of the main

surface of the semiconductor chip.

48. A semiconductor device according to claim 43, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a long side and a short side, respectively.

49. A semiconductor device according to claim 43, wherein the main surface of the semiconductor chip is formed in a rectangular shape in which the first and second sides of the main surface of the semiconductor chip are a short side and a long side, respectively.

50. A semiconductor device according to claim 43, wherein the resin seal member is formed on the main surface of the wiring substrate.

51. A semiconductor device comprising:

a semiconductor chip having a quadrangular main surface;

a wiring substrate with the semiconductor chip disposed on a main surface thereof;

a resin seal member for sealing the semiconductor chip, the resin seal member having a quadrangular main surface which confronts the main surface of the semiconductor chip;

and

a gate cut trace portion formed on a side face of the

resin seal member which confronts one of two side faces of the semiconductor chip extending in a first direction,

wherein the distance from one of two side faces of the semiconductor chip extending in a second direction to a side face of the resin seal member which confronts said one side face is smaller than the distance from the other of the two side faces of the semiconductor chip extending in the second direction to a side face of the resin seal member which confronts said other side face.

52. A semiconductor device comprising:

a wiring substrate having a plurality of wiring lines, a main surface, and a back side;

a first semiconductor chip and a second semiconductor chip both disposed on the main surface of the wiring substrate and connected electrically to the plural wiring lines; and

a resin seal member formed on the main surface of the wiring substrate to cover the first and second semiconductor chips from above, the resin seal member having two first side faces opposed to each other, two second side faces opposed to each other and longer than the two first side faces, and a gate cut trace portion formed on one of the two first side faces opposed to each other,

wherein the first semiconductor chip is disposed between the side face of the resin seal member having the

gate cut trace portion and the second semiconductor chip,
and

wherein the distance between the first and second semiconductor chips is shorter than the distance between the second semiconductor chip and the other first side face not having the gate cut trace portion of the resin seal member.

53. A semiconductor device according to claim 52,

wherein the first and second semiconductor chips are each provided with a plurality of semiconductor elements and a plurality of electrodes on a main surface thereof which is covered with resin seal member,

wherein the wiring substrate is provided with a plurality of electrodes on the main surface thereof in an area between the first and second semiconductor chips,

wherein the plural electrodes on the first semiconductor chip and the plural electrodes on the wiring substrate are electrically connected with each other through a plurality of bonding wires, and

wherein the plural electrodes on the second semiconductor chip and the plural electrodes on the wiring substrate are electrically connected with each other through a plurality of bonding wires.

54. A semiconductor device according to claim 53, wherein the plural bonding wires are each formed by a reverse

bonding method.

55. A semiconductor device according to claim 52, wherein an air vent trace portion is formed on the other first side face not having the gate cut trace portion out of the two opposed first side faces.

56. A semiconductor device according to claim 52, wherein the resin seal member is formed by a transfer molding method.